



RF Exposure Policies

FCC 19-126

TCB Workshop
October 2020

Office of Engineering and Technology
Federal Communications Commission



Outline

- FCC 19-126 rulemaking
 - Effective date
 - Rule changes
 - Exemption
 - Evaluation
 - Mitigation
 - Proposed rules
 - Other actions



FCC 19-126 Rulemaking

- Second Report and Order of FCC 19-126 includes changes to the RF exposure rules
 - Appeared April 1, 2020 in the Federal Register (FR) with correction, delay of effective date published in FR on June 2, 2020
 - Follows from proposals in FCC 13-39 (docket no. 03-137)
 - Changes to RF exposure rules in 47 CFR 1.1307, 1.1310, 2.1091, 2.1093
 - Conforming edits to 47 CFR 1.4000, 2.1033, and Parts 15, 18, 22, 24, 25, 27, 73, 90, 95, 97, 101

FCC 19-126; *Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields*; docket no. 03-137 (Terminated); Adopted: November 27, 2019; Released: December 4, 2019

85 FR 18131-18151; (<https://www.govinfo.gov/content/pkg/FR-2020-04-01/pdf/2020-02745.pdf>)

85 FR 33578; (<https://www.govinfo.gov/content/pkg/FR-2020-06-02/pdf/2020-11969.pdf>)

34 FCC Rcd 11687-11855; (https://docs.fcc.gov/public/attachments/FCC-19-126A1_Rcd.pdf)



Effective Dates

- Changes to 47 CFR 1.1310 went into effect April 1, 2020
 - Removes certain limitations on permitted computational methods
- Changes to 47 CFR 1.1307, 2.1091, and 2.1093 are not yet effective
 - The process has started to establish an effective date
 - These rules may become effective prior to the next TCB Workshop



Compliance Overview

COMPLIANT

Increasing Exposure

NOTICE

CAUTION

*Low Power and/or
Large Distance*

*High Power and/or^{...}
Small Distance*

Exemption

Simple calculation to establish whether further compliance determination is necessary.

Evaluation

Determination of potential exposure levels to ensure compliance by calculation, measurement, or computational modeling.

Mitigation

Post-evaluation procedures to ensure that the exposure limits are not exceeded



New Exemption Criteria

- 1-mW blanket exemption
 - Independent of separation distance and frequency
- SAR-based exemption formulas
 - Separation distances from 0.5 cm to 40 cm
 - Frequencies from 300 MHz to 6 GHz
- MPE-based exemption formulas
 - Separation distance at least $\lambda/2\pi$
 - Examples:
2 m at 24 MHz; 20 cm at 240 MHz; 2 cm at 2.4 GHz
 - Frequencies from 300 kHz to 100 GHz



SAR-Based Exemption (1)

- Exempt if the greater of available maximum time-averaged power or ERP does not exceed P_{th}
- Formulas to be published in amended 47 CFR 1.1307, 2.1091 and 2.1093

$$P_{th}(\text{mW}) = \begin{cases} ERP_{20\text{cm}}(d/20 \text{ cm})^x & 0.5 \text{ cm} \leq d \leq 20 \text{ cm} \\ ERP_{20\text{cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

$$x = -\log_{10} \left(\frac{60}{ERP_{20\text{cm}} \sqrt{f}} \right)$$

$$ERP_{20\text{cm}}(\text{mW}) = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f \leq 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} < f \leq 6.0 \text{ GHz} \end{cases}$$

d = separation distance (cm)



SAR-Based Exemption (2)

Comparison of example exemption threshold power P_{th} levels (mW)
for portable devices at distances ≤ 50 mm calculated
per KDB Pub. 447498 D01 v06 / per amended 1.1307(b)(3)(i)(B)

MHz	mm	5	10	15	20	25	50
300		27 / 39	55 / 65	82 / 88	110 / 110	137 / 129	274 / 217
450		22 / 22	45 / 44	67 / 67	89 / 89	112 / 112	224 / 226
835		16 / 9	33 / 25	49 / 44	66 / 66	82 / 90	164 / 240
900		16 / 8	32 / 23	47 / 42	63 / 63	79 / 88	158 / 242
1500		12 / 4	24 / 14	37 / 29	49 / 49	61 / 73	122 / 254
1900		11 / 3	22 / 12	33 / 26	44 / 44	54 / 66	109 / 236
2450		10 / 3	19 / 10	29 / 22	38 / 38	48 / 59	96 / 219
3600		8 / 2	16 / 8	24 / 18	32 / 32	40 / 49	79 / 195
5200		7 / 2	13 / 6	20 / 15	26 / 26	33 / 42	66 / 175
5400		6 / 1	13 / 6	19 / 14	26 / 26	32 / 41	65 / 173
5800		6 / 1	12 / 6	19 / 14	25 / 25	31 / 40	62 / 169



MPE-Based Exemption

- Exempt if ERP does not exceed the specified threshold
- Separation distance (R) must be at least $\lambda/2\pi$
- Formulas to be published in amended 47 CFR 1.1307
- Aligns with existing MPE limits under conservative exposure assumptions

Transmitter Frequency (MHz)	Threshold ERP (W)
0.3 – 1.34	$1,920 R^2$
1.34 – 30	$3,450 R^2/f^2$
30 – 300	$3.83 R^2$
300 – 1,500	$0.0128 R^2 f$
1,500 – 100,000	$19.2 R^2$



Changes to Evaluation

- Numerical computation of SAR
 - Allow use of any valid computational method
 - Must be supported by adequate documentation showing full validation, and performed according to FCC-accepted standards or procedures(47 CFR 1.1310(d)(1))
- Remove the 5 cm minimum evaluation distance for frequencies above 6 GHz (47 CFR 2.1093)



Changes to Mitigation

- Establish more specific mitigation measures for transmitter sites where RF exposure limits may be exceeded
 - Access control, signage, and training requirements
 - To be published in amended 47 CFR 1.1307(b)(4)
- Primarily applicable to fixed transmitters



FCC 19-126 Proposed Rules

- Notice of Proposed Rulemaking of FCC 19-126 appeared Apr. 6, 2020 in the Federal Register
 - Extension of exposure limits below 100 kHz and above 100 GHz
 - Localized exposure limits above 6 GHz
 - Device-based time-averaging for exposure compliance
 - Wireless power transfer devices
- Proposed rules align with existing RF exposure framework
- Comment and reply comments have been collected and are under review

FCC 19-126; *Targeted Changes to the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields*; docket no. 19-226; Adopted: November 27, 2019; Released: December 4, 2019

85 FR 19117-19126; (<https://www.federalregister.gov/documents/2020/04/06/2020-06966/human-exposure-to-radiofrequency-electromagnetic-fields>)

85 FR 35405-35406; (<https://www.federalregister.gov/documents/2020/06/10/2020-12417/human-exposure-to-radiofrequency-electromagnetic-fields-reopening-of-comment-period>)

34 FCC Rcd 11687-11855; (https://docs.fcc.gov/public/attachments/FCC-19-126A1_Rcd.pdf)



FCC 19-126 Other Actions

- The FCC 19-126 item includes two other FCC actions:
 - Resolution of Notice of Inquiry; docket no. 13-84
 - Continues existing:
 - SAR and MPE limits, including as pertaining to children
 - SAR evaluation basic procedures, including test separation distance requirements
 - RF exposure information dissemination processes
 - Memorandum Opinion and Order; docket no. 03-137
 - Dismiss petition-for-reconsideration (DOC-322492; Public Notice Report No. 2988; 78 FR 52893; Aug. 27, 2013) thus affirm prior decision that pinnae (outer ears) are subject to extremity SAR limits
 - Both actions are included in the Apr. 1, 2020 Federal Register summary of FCC 19-126



Questions?